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# The identity of Mucor Mucedo

Guy West Wilson

The modern genus *Mucor* dates from the first edition of Linnaeus's Species Plantarum * in which eleven species are named. Of these only *M. Mucedo* is retained in the genus by modern mycologists while the others are distributed among various genera of Lichenes, Myxomycetes and Hyphomycetes. According to the Genera Plantarum † of 1754 the genus is coextensive with "Mucor *Mich.* 95. Mucilago *Mich.* 96. Lycogala *Mich.* 95." It is interesting to note that none of Micheli's species of *Mucilago* or of *Lycogala* appear among the Linnaean species, of which *Mucor Mucedo* alone is common to both authors. This species is, therefore, the type of the genus. For this reason it is important to know to what Linnaeus applied the name and whether it is used in the same sense to-day. An examination of Linnaeus's citations and of their collateral references is amply sufficient to determine the first point while recent mycological literature holds a wealth of information upon the second.

The citations in the Species Plantarum ‡ are as follows :

"6. Mucor stipitatus, capsula globosa. *Mucedo.*
Mucor filamentis granulatis fugacibus putrescentibus innatis. *Fl. lapp.* 534. *Fl. suec.* 1119. *Roy. lugdb.* 520.
Mucor vulgaris, capitulo lucido per maturitatem nigro, pediculo griseo. *Mich. gen.* 215. *t.* 95. *f.* 1.
Mucedo capitulo diaphano deinde viridi & postremo nigro. *Malp. vegetat. t.* 25. *f.* 108. *p.* 2.
*Habitat in variis putridis : pane, plantis, &c.*"

The first series of references ultimately reduce themselves to the second. The genus *Mucor* was originally founded by Micheli § with four species. A translation of his characterization is as follows: "*Mucor* is a genus of globular plants which are usually stipate but sometimes sessile, all bursting irregularly and containing a cavity in which are numerous small rounded seeds which are affixed to a placenta." With a single exception these characters are all drawn from *Mucor vulgaris* which is further described as having a white head (capitulum) which turns black at maturity and is supported by a grey stripe. The elaboration of the genus is followed by a reference to certain experiments conducted by Micheli, during the autumn and winter of 1718–19, for the purpose of determining the validity of species among the fungi. One of these experiments* deals entirely with *Mucor vulgaris* and is described in detail. On the 5th of November a piece of pumpkin was sown with the spores (semina) of the black mould and placed in the sun. By the 10th of the month the infected portion of the substratum appeared white and was covered with long slender threads resembling white wool. Two days later these were about an inch high and by the 12th were assuming a grayish tint. A few of the filaments also bore white heads which were matured by the 15th. Spores from this culture were sown the next day upon the same substratum and by the middle of January following six generations of *Mucor* had been cultivated from a pedigreed strain.

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* Pages 1185 and 1186. 1753.

† Page 493.

‡ Page 1185.

§ Nova Plant. Gen. 215. *pl. 95.* 1739.

The account of these experiments contains the key to the identity of Micheli's *Mucor vulgaris* and the Linnaean *M. Mucedo.* They may be duplicated by infecting a piece of pumpkin or sweet potato with the spores of the mould which passes current as *Rhizopus nigricans* Ehrenb. That the identity of these species is beyond question is evident from Micheli's own writings. This conclusion is further strengthened by his reference to Malpighi† who describes the stoloniferous habit of this mould and figures the collapsed columellae.

With this identity in mind it is interesting to trace the "historical usage" of *Mucor Mucedo.* Between 1753 and 1790 this mould was reported from all the principal countries of central and western Europe, and frequently described and figured.* The descriptions all agree in a most satisfactory manner, the figures are all referable to the same species, the habitat agrees with that given by Linnaeus and Micheli, the synonymy is in the main correct. No new name was proposed either for this or for a closely related species until Bulliard † published his *Mucor sphaerocephalus*, which he himself admits is but a second rechristening of *M. vulgaris*. The first real step toward complicating the synonymy of the species was taken by Tode ‡ when he redescribed it as *Ascophora Mucedo*. Some years later Ehrenberg redescribed the stoloniferous habit of the species, renamed it *Mucor stolonifer* § and later made it the type of the new genus *Rhizopus*. ‖ A few years later Link ¶ recognized as valid species a number of forms of *Mucor Mucedo* which differed from each other in substratum and in characters for which the substratum and the stage of development would account.

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* Observatio II. *l. c.* 137.

† Anat. Plant. **2**: 64, 65. *pl. 28. f. 108.* Reproduced in Malp. Opera Omnia **1**: 142, 143. *f. 108.*

The confusion became so great that Fresenius ** attempted to bring order out of the chaos. After examining the figures of *Mucor Mucedo* L., *Ascophora Mucedo* Tode and *Rhizopus nigricans* Ehrenb. from the time of Malpighi down, and contrasting the descriptions of these species he decided that there were no characters upon which to separate the genera and that therefore "we had best return to the old genus *Mucor*, and with Link recognize a *Mucor stolonifer* (*Rhizopus nigricans* Ehrenb.) and *Mucor Mucedo*, of which last *Mucor ascophorus* Link and *Ascophorus Mucedo* Tode are merely synonyms." So far the results of this work appear to unravel the nomenclatural tangle of the species in question. Permanent results would have rewarded his labor had he not fallen into a still graver error than that which he strove to counteract, and described and figured in detail, under the name of *Mucor Mucedo* L.,* the plant which is now known by that name; this, however, had never appeared in botanical literature until 1791 when Tode described it as *Hydrophora stercorea*.† The *Mucor Mucedo* of Linnaeus and the older mycologists is a black mould which grows profusely upon bread, fruits and other vegetable substances, while the *Mucor Mucedo* of Fresenius and his followers (de Bary, Zimmermann, Brefeld and the vast majority of modern mycologists) is a gray mould which inhabits dung of various animals and appears upon vegetables substances as rarely as does the first species upon dung.

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* Monti, Bononiensi Acad. Comment. 3: 141–159. *pl. 1.* Bologna. 1755. — Hudson, Flora Anglica 504. 1762. — Scopoli, Flora Carniolica 67. 1760. — Wulff, Flora Borussica 1. 1765. — Haller, Hist. Stirp. Helv. 3: 113. 1768. — Oeder, Flora Danica *pl. 467. f. 4.* 1769. — Bolton, Fung. Halifax 3: 132. *pl. 132. f. 1.* 1789. — Lightfoot, Flora Scotica 1072. 1789. — Bulliard, Herb. France *pl. 480. f. 2.* 1789.

† *L. c.*, and Champ. France 112. 1791.

‡ Fungi Meckl. Sel. 1: 13. *pl. 3. f. 22.*

§ Sylvae Myc. Berol. 13, 25. 1818.

‖ Nova Acta Acad. Leop. $10^1$: 198. *pl. 11. f. 1–6.* 1820.

¶ Willd. Sp. Pl. $6^1$: 85ff. 1824.

** Beitr. Myk. 4–13. 1850.

The chief synonymy of the two species of moulds which have at various times passed under the name *Mucor Mucedo* L. is as follows:

1. MUCOR MUCEDO L. Sp. Pl. 1185. 1753.
    *Mucor vulgaris* Mich. Nova Plant. Gen. 215. *pl. 95. f. 1.* 1729.
    *Mucor sphaerocephalus* Bull. Herb. France *pl. 480. f. 2.* 1789. Not *M. sphaerocephalus* L. 1753, nor *M. sphaerocephalus* Batsch 1783.
    *Ascophora Mucedo* Tode, Fungi Meckl. Sel. **1**: 13. *pl. 3. f. 22.* 1790.
    *Mucor ascophorus* Link, in Willd. Sp. Pl. **6**$^1$: 85. 1824.
    *Mucor stolonifer* Ehrenb. Sylvae Myc. Berol. 13, 25. 1818.
    *Rhizopus nigricans* Ehrenb. Nova Acta Acad. Leop. **10**$^1$: 198. *pl. 11. f. 1–6.* 1820.
2. MUCOR STERCOREUS (Tode) Link, in Willd. Sp. Pl. **6**$^1$: 90. 1824.
    *Hydrophora stercorea* Tode, Fungi Meckl. Sel. **2**: 6. 1791.
    *Mucor caninus* Pers. Obs. Myc. **1**: 96. *pl. 6. f. 3, 4.* 1796.
    *Mucor Mucedo* Fres. Beitr. Myk. 7. *pl. 1. f. 1–12.* 1850. Not *M. Mucedo* L. 1753.

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* *L. c. 7. pl. 1. f. 1–12.* 1850.

† Fungi Meckl. Sel. **2**: 6.